Interpretative Research in Information Systems: Two Qualitative Research Design Projects

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Abstract: In a scientific research project is important to define the underlying philosophical orientation of the project, because this will influence the choices made in respect of scientific methods used, as well as the way they will be applied. It is crucial, therefore, that the philosophy and research design strategy are consistent with each other. These questions become even more relevant in qualitative research. Historically, the interpretive research philosophy is more associated to the scientific areas of social sciences and humanities where the subjectivity inherent to human intervention is more explicitly defined. Information systems field are, primarily, trapped in computer science field, though it also integrates issues related with management and organizations field. This shift from a purely technological guidance for the consideration of the problems of management and organizations has fostered the rise of research projects according to the interpretive philosophy and using qualitative methods. This paper explores the importance of alignment between the epistemological orientation and research design strategy, in qualitative research projects. As a result, it is presented two PhD projects, with different research design strategies, that are being developed in the technology and information systems field, in the light of the interpretive paradigm.

Keywords: information systems design; research design; interpretative paradigm; qualitative research; grounded theory method

1. Introduction

The rigor of scientific knowledge in engineering research is a central issue. The knowledge generated, besides being technological must be scientific, i.e., it cannot be assumed that science itself means technology (Feibleman (1961)).

Science is the scientific knowledge about the regularities of the world phenomena based on the perceived observations of these same phenomena in the light of a particular worldview or a science paradigm - an epistemological orientation (Blaikie, 2009; Lee & Baskerville, 2003). Science pursues two human purposes: the knowledge (understanding – pure or theoretical science) and the how to do (action - applied science) (Marconi & Lakatos, 2003).

On the other hand, technology is the knowledge of how to act in the world. It is a practical expression of intelligence, not the result of an unplanned event. The essential process, along with the finding procedure, is to build an artefact for a particular purpose and to evaluate its performance as well as to justify its usefulness (Lee & Baskerville, 2003).

In this context, research and development are human activities aiming to create and expand the boundaries of the existing and the scientific knowledge, developing both science and technological knowledge, therefore improving of the world. Thereby, scientific rigor and practical relevance are the central issues in scientific and technological research (Baskerville & Myers, 2002; Hirschheim & Klein, 1989; Klein & Myers, 1999).

These issues are particularly relevant in qualitative research. Qualitative research aims to help researchers to understand the social and cultural contexts within which people live and use technology. Qualitative researchers argue that it is impossible to understand why someone did something or why something

happened in an organization without talking to people about it. What, why, how and when are the typically questions that qualitative researchers ask (Klein & Myers, 1999; Myers, 1997; Myers, 2013).

Accordingly, this paper explores the importance of alignment between the epistemological orientation and research design strategy, in qualitative research projects. Furthermore, it is presented two PhD projects, with different research design strategies, that are being developed in the technology and information systems field, in the light of the interpretive paradigm.

To achieve this objective we defined the following main question, which guided the literature review: (i) How to conduct a qualitative research?; (ii) What issues arise when analysing the epistemological assumptions underlying the interpretive approach?; (iii) Which methods should be considered to answer the research questions of these projects?

To answer these questions, we started conducting an exhaustive bibliography review of the authors most relevant to the scientific area, identifying curriculum authors, books, book chapters, papers presented at conferences and published articles in scientific journals: David Avison, Michael Myers, Geoff Walsham, John Mingers, Richard Baskerville, Rudy Hirschheimer. This literature review was conducted by Scopus, Google Scholar, ISI Web of Knowledge. The documents were collected through the UM catalog, b-on; RCAAP, IEEExplore, Colcat.

Then, based on this extensive bibliography, we proceeded to the identification of the most relevant papers, gathering all those whose title refers to the following combination of words: "research paradigms", “qualitative research”; “interpretive research”; “research design” and / or “information systems and technologies".

This paper is organized as follows. In section 2, supported by a theoretical reflection on the science paradigm underlying the research study that best fits the way the researcher observe the regularities in the world (Orlikowski & Baroudi, 1991), establishing the interpretive guidance of two research projects (RP) studied in this paper. The clarification and justification of the philosophical assumption underlying the phenomenon under study is crucial because it will have implications in the way the entire process of creation and development of knowledge will be conducted. Following, in section 3, supported in the interpretive guidance, we present the research design strategy and the underlying methods of the two projects. Finally, the conclusions of this work are presented.

In short, this paper aims to highlight the importance of interpretive studies in Information Systems and Technologies (IST) field, ensuring the scientific rigor and the practical relevance, as well as sharing experiences of developing qualitative research projects.

2. Interpretativism in information systems research

The activity of research and development implies, above all, to know in depth the purpose of the research and the way the subject area is studied (Vasconcellos, 2008). Literature references, mainly, three research paradigms: positivism, interpretivism and critical, showing their strengths and weaknesses (Blaikie, 2009; Myers, 2013; Orlikowski & Baroudi, 1991).

In recent years, scientific studies of the IST field were dominated by the positivist and engineering paradigms. However, the emergence of new research topics that can only be fully understood if studied in depth and for longer periods of time, such as organizational and systems design, organizational interventions, management information systems, technology development and their social implications, led to a paradigm shift and to the emergence of interpretivism in IST field research (Avison et al, 2008; Myers, 2013; Walsham, 1995).

Klein and Myers (1999) research, performed according to interpretativism philosophy, assumes that the knowledge of individual reality is achieved, only, through social constructions such as language, consciousness, shared meanings, documents, tools and other artefacts. Such research focuses on the complexity of human interpretations about the arising situation (Kaplan & Maxwell, 2005). This kind of research attempts to understand phenomena through the meanings that people attach to them (Klein & Myers, 1999). So, the research methods and tools of the natural sciences are seen as being inappropriate for the study of social and

organizational phenomena. In interpretive studies, the research design involves exploration of a research topic or theory, rather than being a test of it (Myers, 2013; Walsham, 2006).

Klein and Myers (1999) suggest a set of principles for evaluating and developing of interpretative research: hermeneutic circle, contextualization, interaction between the researchers and the subjects, abstraction and generalization, dialogical reasoning, multiple interpretations, and suspicion. They argue that these principles should be clearly verified in any qualitative research, in order to ensure the scientific rigor of the study.

The question of explaining the philosophical positioning becomes even more relevant when the research is qualitative (Myers 2013), like it is the case of research projects (RP) described in the following.

The first research project (RP1), within the subject of innovation intermediaries with crowdsourcing, studies the topics of open innovation, crowdsourcing and innovation intermediation.

Open innovation is a recent topic in the management of innovation characterized by a new way of interacting and collaborating with the external environment of a company to innovate more successfully and with less cost. Chesbrough (2006) argues that firms can and should use both external ideas to the organization as the ideas of their R&D departments, and both should be possible ways to access the market and develop its technology.

Innovation intermediaries, in general sense, are organizations that work to enable innovation, that just act as brokers or agents between two or more parties. Usually, they are also engaged in other activities like inter-organizational networking and technology development and related activities (Daziel, 2010).

Crowdsourcing innovation is presented as a derivation of this new paradigm taking advantage of the Web 2.0 tools for generating new ideas through heterogeneous knowledge available on the global network of individuals with easy access to information and technology (Howe, 2006, 2008; Surowiecki, 2005; Tapscott & Williams, 2008).

Crowdsourcing innovation brokers are organizations that mediate the communication and relationship between the seekers – companies that aspire to solve innovation problems or to take advantage of any business opportunity – and a crowd that is prone to give ideas based on their knowledge, experience and wisdom. The crowd is usually composed by specialists in different areas, such as individual researchers, research teams, labs, post-graduate students and highly qualified individuals. These brokers are mainly based in a web platform that facilitate access to a large community and provides support in the integration of the contributions of this community, without further participation in the innovation intermediation process.

Ramos et al. (2009) argue that an intermediate of crowdsourcing innovation must include three modules in the value creation process of an organization: community development, brokering and transfer of technology.

There have been some initiatives and derivation of the crowd exploitation: crowdsourcing, crowdfunding, crowdjobbing, crowdauditing, crowdcontrol, crowdcuration and crowdcare (Lebraty & Lobre-Lebraty, 2013). However, there is no knowledge model (concepts and relationships) which establishes an innovation intermediary with crowdsourcing that integrates the areas of open innovation, crowdsourcing and intermediation.

This project is positioned on the philosophy of interpretive research both in ontological and epistemological terms. This means that the area of study, brokering of technological innovation with crowdsourcing, is understood and built with all the players (brokers and consultants, costumers ("seekers"), anonymous in the network that solve problems ("solvers") and technological platforms that support intermediation) and with the way they interact, and not defined only by the technological platforms and tools used by these intermediaries supporting the interaction. Thus, the research methods will be applied in order to interpret and examine the technological innovation intermediaries with crowdsourcing, from which arise the constructs and relationships between them that explain this phenomenon.

In the second research project (RP2), the subject of electronic public procurement oriented to public value, it is considered that the technological solutions that support the procurement processes should avoid following

the same models developed for the private sector (Ferreira & Amaral, 2012; Hui & Hayllar, 2010; Moore, 1994, 1995). The public sector must develop their own models of electronic purchasing, optimizing the organizational objectives through the alignment with the citizens preferences, in terms of using the public funds (public value), and considering the impact on process and on the organization (G & Hayllar, 2010; Ferreira & Amaral, 2012; Coats & Passmore, *n.d.;* European Commission, 2010; EURODAD, 2009).

Following this, and in the e-government context, there is a lack of alignment between management models of integrated and cross of public procurement oriented to public value and of technological solutions (G & Hayllar, 2010; Moore, 1994, 1995). The lack of alignment, therefore, implies the inexistence of: (i) an insight on integration and cross management of the organizational competence "manage public procurement", (ii) technological solutions that support this vision, (iii) methods for evaluating the impact of electronic procurement in organizations and society (Ferreira & Amaral, 2012).

There are several references in the literature about the importance of using information and communication technology (ICT) in the processes of public procurement (G & Hayllar, 2010; Bof & Previtali, 2010; European Commission, 2010; EURODAD, 2009; Kassim & Hussin, 2010). Some authors (ref)add that any effort for developing these solutions should take into account both perspectives of management and technological.

From a management perspective, procurement is a strategic function of organizations. Although, some similarities could be found on the procurement process in private institutions, the procurement strategies are presented differently in public context (Ferreira & Amaral, 2012; Bof & Previtali, 2010; Hardy & Williams, 2008; European Commission, 2010).

The focus on value (value for money), competitiveness and the accountability are commonalities that any procurement process, regardless of their public or private context, seeks to achieve (EURODAD, 2009; O´Flynn, 2007). However, Hardy and Williams (2008) state that public procurement have different implication for the welfare and policy formulation in order to ensure that they promote justice, equity and transparency (European Commission, 2010).

All these specificities of public procurement should be guaranteed by the design of technological solutions. So we advocate the need to think and define, integrated and cross terms, a conceptual model of public e-procurement as a way to guide the technological development (Ferreira & Amaral, 2012). This is the expected result of the RP2.

3. The research design of two research projects

Research methodology refers to the discussion of how research is developed, the way knowledge is generated and justified. It is one of the steps of scientific research, which arises from a theoretical perspective (philosophical orientation) and leads to the selection of specific methods and techniques for collecting and analysing data about the reality under study (Blaikie, 2009). In other words, the focus of the methodology study is in finding strategies to increase the valid knowledge resulting from research, enclosed in a research paradigm (Marconi and Lakatos, 2003). It is through the research strategy that the scientific rigor is guaranteed.

In this context, according to Myers (2013) all qualitative research project should follow essential steps, as it is illustrated in Figure 1.

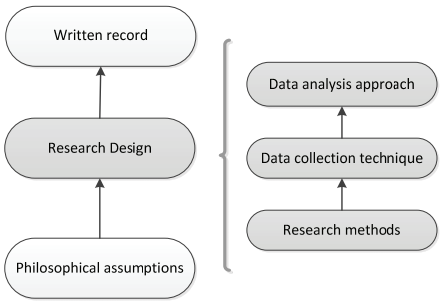

Figure 1: A model of a qualitative research design (adapted from (Myers, 2013, p. 24))

Based on this model, this paper explores the importance of alignment between the epistemological orientation and the research design (a combination of research methods) in qualitative research projects. Therefore, the research design strategy of both projects follows this model, as described below.

As a result of RP1 is planned to develop a model of knowledge (concepts and relationships) to define and justify an innovation intermediary with crowdsourcing.

As mentioned in section 2, in the literature there is no model of knowledge that explains an innovation intermediary with crowdsourcing. Thus, the method of Grounded Theory (GT) is used to systematically collect and analyse data for this model of knowledge (set of constructs and relationships).

GT method comes from the Social Sciences and is defined, by the original authors Glaser and Strauss, as the method to construct a theory from the data obtained and analysed systematically. The key point of this method is fact that the theory being produced is substantiated, i.e., is supported in the data (Glaser & Strauss, 1967).

The authors highlight two key factors of the method: the need to generate new theories rather than forcing the data to fit on already existing theories, and that the data used to generate and verify the theory can be both qualitative and quantitative data.

The GT method fits in the methods of inductive research, where theory is induced by the data, i.e., emerges from data, and is built from there, so it says that the theory is grounded in the data (Glaser & Strauss, 1967). Urquhart et al (2010) identified four key features of GT:

- The main goal is to build a theory;
- Researchers must ensure no preconceived theoretical ideas before starting the study;
- The analysis and conceptualization are engendered through the main process of constant comparison, where each component of data is compared to all existing concepts and constructs, to verify if it enriches any existing category (adding or enhancing their properties), creates a new category or establishes a new relationship;
- Slices of all data types are selected by a process of theoretical sampling, where researchers decide with analytical foundation, which the next slice to be included in the sample.

The process of data analysis provides three main stages. The GT Strauss version of these stages is open coding, axial coding and selective coding, while the GT Glaser version is open coding, selective coding and theoretical coding. Although both versions consider selective coding, these concern to different processes (Charmaz, 2006; Urquhart, 2013). In this project were used the stages defined by Glaser:

- Open coding: process of assigning codes to the data, line by line, and sometimes word by word. The codes should be analytical rather than descriptive. This is an iterative and reflective process, i.e., in a progressive manner descriptive codes must pass to analytical codes, consequent of the analysis of the entire slice of data being analysed;
- Selective coding: expansion / transformation of open codes in the categories that is important to the problem being studied. The open codes are organized into selective codes that may contribute to the main categories of the theory. Some open codes, or its variations, are transformed into larger categories and others become properties or dimensions of these categories. The categories will be constructs based in terms assembled from data;
- Theoretical coding: process of relating categories to each other. This means to establish relationships that make ideas relevant, is the new and unique phase of the theory. Relationships can come from three sources: other categories; ideas of relationships coming from the literature; and theoretical codes introduced by (Glaser, 1978). Whatever the source is, the relationships also need to be verified and substantiated in the data.

Urquhart et al (2010) suggest a framework for theorizing in GT which relates the degree of conceptualization (level of analysis carried out) with the theory scope (scope of the theory actually produced). The first level yields the description of the study, with the initial data collection, coding and memos. In terms of theory scope these represent a “Bounded Context” theory, which means that it has a narrowest scope. The second level is

the interpretation of categories and properties using selective coding, theoretical memo-writing, and memo sorting. At this level, the theory will be "Substantive Focus", extends its predictive and explanatory power to the specific set of phenomena from where it was developed. This kind of theory is no longer simply based on seed concepts but has been developed by the rigorous application of grounded theory procedures. The third level, theorizing, yields diagramming concepts and results in the formulation of a theory. The aim is to create inferential and/or predictive statements about the phenomena. This is achieved by stipulating explicit relationships between individual interpretive constructs. The theory scope, at this level, is "Formal Concepts". A formal theory is the widest form of grounded theory that can be developed.

Figure 2 represents the GT process of coding and analysis synthesized by Charmaz (2006) combined with the framework suggested by Urquhart et al (2010).

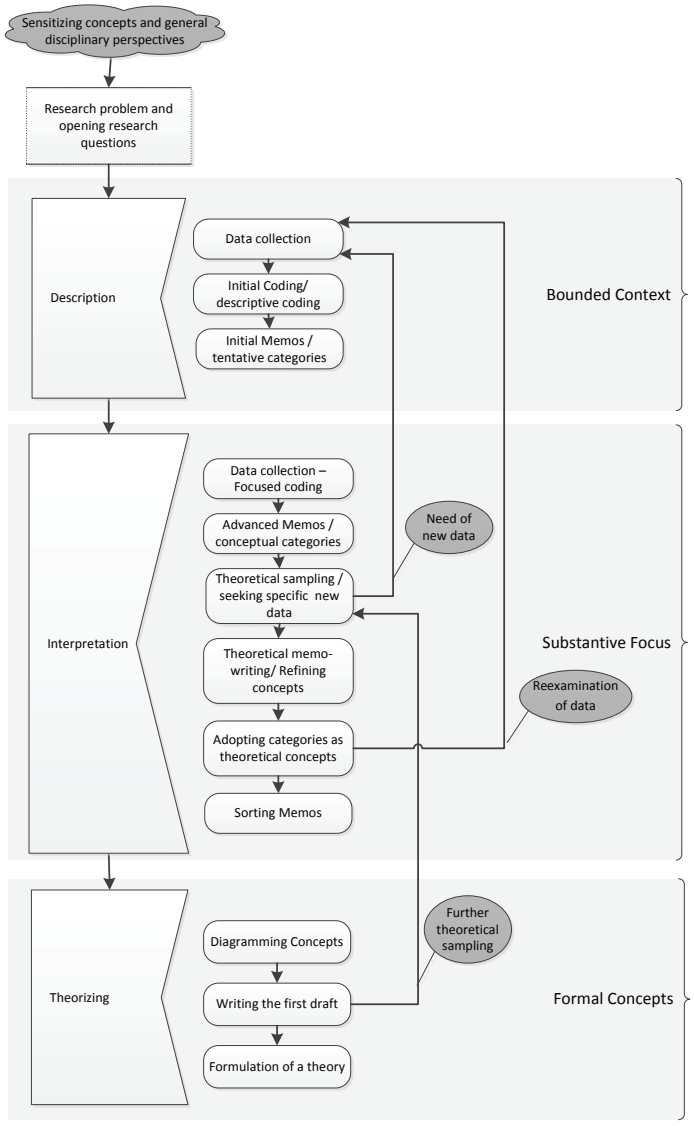

Figure 2: Grounded theory framework (adapted from (Charmaz, 2006; Urquhart et al, 2010))

One of the things referred to as essential and controversial in GT is that Glaser and Strauss recommend that the literature review should be performed only after building a theory and not before. This recommendation is justified by the need of the researcher not to be influenced by existing theories in the literature and therefore not forcing the presence of these theories in the data. However, this recommendation does not preclude conducting a literature review before starting the empirical work, although the research must take care not to influence the coding process. Urquhart (2013) argues that it can be conducted a literature review, with no commitment to any theory, at the beginning of the study to analyse which existing theories in the field and how researchers have addressed aspects of defining the research problem, without imposing a framework for

collecting data. This preliminary literature review is conducted with the understanding that the theory generated will determine the relevance of literature.

In this project, the sensitizing concepts reviewed in the literature are open innovation, crowdsourcing innovation and innovation intermediaries, witch lead to the following open research question: What is the explicit knowledge (concepts, relationships and experiences) that defines an innovation intermediary with crowdsourcing?

The strategy to develop this research project was to conduct a Theoretical and an Empirical study, as represented in Figure 3.

In the theoretical study, a literature review of cases was conducted in the areas of Crowdsourcing innovation, Open Innovation, and Innovation, Technology and Knowledge Intermediaries. This study were developed a theoretical framework of knowledge of the intermediary (Silva & Ramos, 2012).

In the empirical study four groups of companies covering the areas under study were researched. To gather information on the business model of these companies the technique of half-structured interviews was used. The gathered research information is being to develop an empirical framework of crowdsourcing innovation intermediaries. At the end, both frameworks, theoretical and empirical, will be analysed comparatively to develop the final framework for crowdsourcing innovation intermediary.

Triangulation allows studying the same topic from different perspectives. It permits a more comprehensive view of the phenomenon, through the triangulation of data from interviews with data from documents, or data from two different research methods (Myers, 2013). In this project, triangulation will be conducted comparing the two developed frameworks, one derived from interviews and the other derived from case studies papers.

Finally, the literature review is revisited and extended, according to the framework generated from the data.

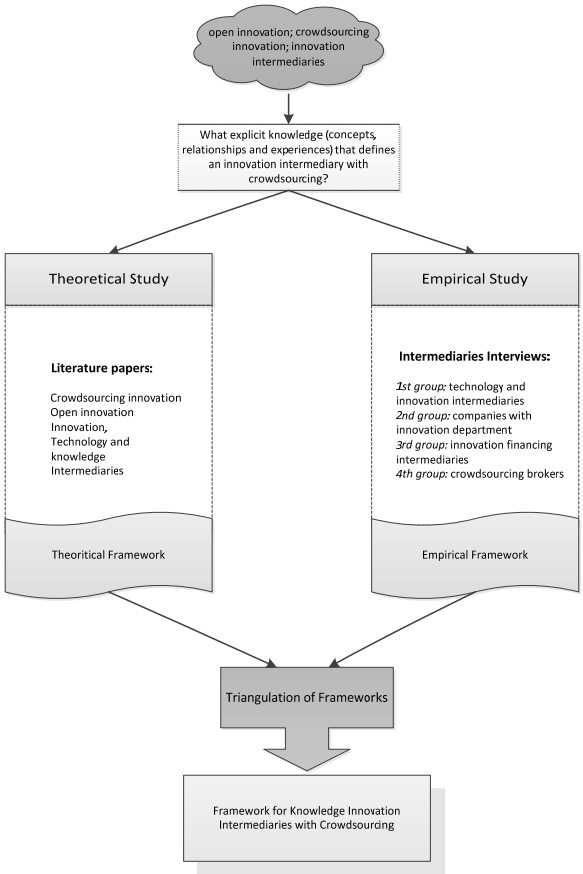

Figure 3: RP1 research design strategy

In the RP2 is defined as a subject of research the alignment between integrated and transversal management models of public procurement oriented to public value and the technological solutions (Ferreira & Amaral, 2012).

In this sense, and based on the theoretical assumptions - (i) public management in the context of the governance and the paradigm of public value, (ii) create public value through ICT, but as an endogenous factor, (iii) information systems as socio-technical systems - it is argued in this research the thesis that:

- The electronic public procurement have been managed and treated in a predominantly technological perspective;
- Electronic public procurement have been influenced by a narrow view of the management of public procurement;
- It is possible and desirable to propose an integrated and cross model of e-public procurement oriented to public value, that:
- *evaluate the impact of public procurement in the public value;*
- *permitting to monitor every phase of processing, from the survey the needs, the pre-contractual process and implementation phase, in the context of the political process.*

The demonstration of the exploration of the aforementioned thesis is achieved by looking for the answer to a set of research questions, grouped into three categories, according to the guidelines presented by Soares (2009), as described in the following table:

Table 1: RP2 research questions (RQ)

Category 1: Focus on identifying (what?)		research strategy: phase 1
RQ1	What is the context of formulation, conduct and implementation of the procedures for public procurement?	
Category 2: Focus on understanding (why?)		
RQ2	Within the context identified in research question 1, what is the procedure of public procurement?	
RQ3	What technological solutions are currently available to support the electronic public procurement?	
RQ4	Considering the results for RQ1 and RQ2, how are functionally structured these technological solutions?	
Category 3: Focus on interventions (How?)		research strategy: phase 2
RQ5	How can, in practice, governments use the technology solutions for public procurement which to assess the impact of purchasing decisions in the organization and in the public value?	
RQ6	In the context of e-Government, what is the better concept of organizational competence "manage public contracts" in order to assess their impact on the organization and the society, creating, in this sense, public value?	

The electronic public procurement should not be seen as a further draft technology (restricted vision), but as an opportunity for the organizational change. Given the evidence found in the literature, it argues the need to find innovative solutions to public procurement through adopting ICT (Bof & Previtali, 2010). Therefore, it is necessary to define a research strategy.

Considering the research problem, the thesis defended and the associated questions, the main objectives (MO) of this research project are:

- MO1: Propose a conceptual model for integrated and cross management of the organizational competence "manage public contracts" in order to improve the performance of organizations and public services, either internally or in its relationship to society, in the light of the paradigm of public value (as a result RQ1).

To achieve this objective, it is fundamental defining the specific objectives (SO), as proposed by Mendoza (2009):

- SO of epistemological orientation:

- *SO1: Explain and support the process of the investigation of this issue framed by the design research, combining different methods of qualitative research, following the interpretive epistemological orientation (Myers 2013).*
- Theoretical SO (scientific rigor):
- *summary of the relevant literature for supporting the research problem and, accordingly, identify key constructs, as well as to support the design of the integrated management model of electronic public procurement oriented to the public value.*
- Empirical SO (practical relevance):
- *ESO1: validate the practical relevance of the integrated management model of electronic public procurement oriented to public value.*
- *ESO2: validate the integrated management model of e-public procurement oriented to public value.*
- *ESO3: evaluate the results in terms of relevance to the scientific and technological knowledge.*

To achieve the objectives is necessary to define the research strategy. In this context, it is adopted the design research presented by Offermann et al (2009), as is illustrated in Figure 4.

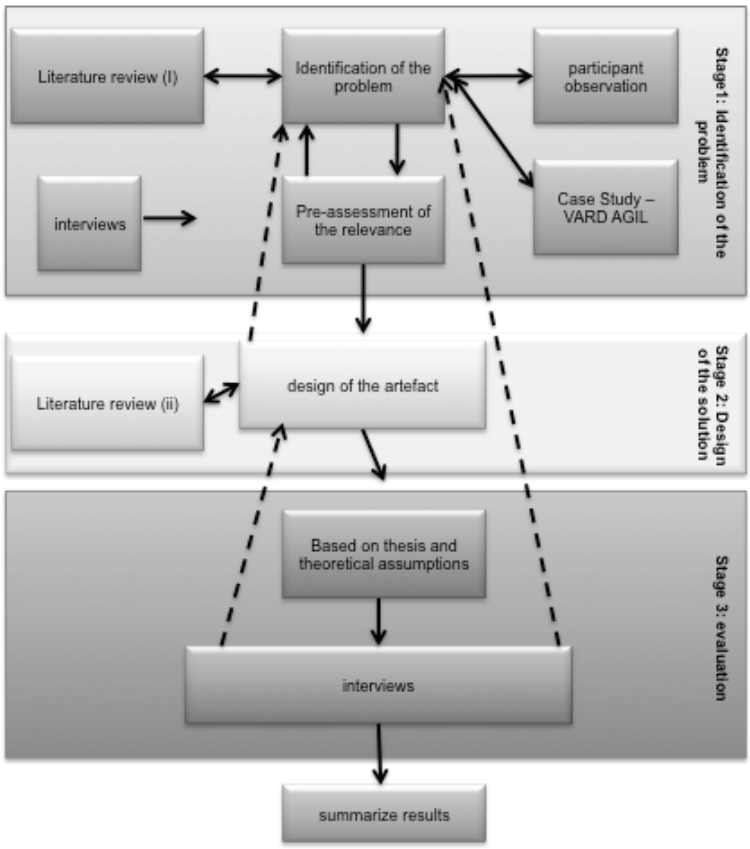

Figure 4: RP2 research design strategy

4. Conclusion

The research philosophy is defined by an epistemology, which concerns to the way knowledge is built, i.e., what is the format used in the research project to increase the knowledge of the body of knowledge area; and by an ontology, which referrers to how the researcher perceives the reality, i.e., reflects the way the researcher considers the construction of the world. Orlikowski & Baroudi (1991) define epistemology as the criteria used to construct and evaluate the knowledge and ontology by the research view of the world, i.e., if the physical and social worlds are objective and exists independently of people or if they are subjective and only exists through human intervention. The clarification of the philosophical positioning is crucial in any research project because this will influence the choices made regarding the research strategy, i.e., the choice of scientific methods as well as its application.

The philosophy and the research design strategy must be consistent. Kumar (1999, p.4) states that the scientific procedure, the research strategy as "(…) being undertaken within a framework of a set of philosophies; (...) uses procedures, methods and techniques that have been tested for their validity and reliability; (…) and is designed to be unbiased and objective". The clarification of this theoretical framework is particularly relevant in the area of information systems and technology, considered a design activity, where the results are artefacts (constructs, models, methods or instantiations). In this area of research, we must ensure that knowledge beyond improving real-world conditions, i.e., with technological nature, will be also validated by the criteria of scientific research (Baskerville & Myers, 2002; Myers, 2013).

Therefore, this paper present two research projects (RP) that are being conducted the information systems and technology field, under the assumptions of the interpretivism. Furthermore, both RP are based on a qualitative approach and take constructivism as ontological orientation (Blaikie 2009). However, these RP follow different research strategies. The RP1 study is about innovation intermediaries with crowdsourcing and is being developed according to the principles of grounded theory. In turn, the RP2, is about electronic public procurement oriented by public value, is being conducted through the design research approach. The main contribution of this paper is the description of two design research projects, in the information systems and technology field, as examples of scientific project based on interpretivism assumptions, but with distinct design research strategies, methods and techniques. The development of a research project guided by these orientations allows the adoption of proper data collection methods, the ability to understand the rational and behaviour and the ability to refine the issues and ideas that emerge. However, it was also identified several weaknesses, namely, the period of time required to develop the research, the need to justify the interpretations and motivations to limit subjectivity in order to avoid emotional analysis. Considering the strengths, and seeking to minimize weaknesses, we pursue, in an axiological dimension, to understand and describe the phenomenon being studied, assuming, in ontological terms, that the reality observed is a human subjective and inter-subjective construction. Epistemologically, facts and values are interconnected so that the knowledge exists as a social process. Research assumptions, values and beliefs delineate the research, which must be explicitly justified. The purpose is not to generate theories through abstraction and generalization of organizational phenomenon, but to achieve insights and knowledge inherent to the phenomenon problem observed (Blaikie, 2000).

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